BC Hydro

Burrard Thermal Generating Plant

Progress Report No. 2
On preparation for applications for permits under the Waste Management Act

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BURRARD THERMAL GENERATING PLANT PROGRESS REPORT NO. 2 ON PREPARATION FOR APPLICATIONS FOR PERMITS UNDER THE WASTE MANAGEMENT ACT

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1	Burrard Thermal Generating Plant: Public Information and Consultation Program

SUMMARY

B.C. Hydro is planning to submit applications to regulatory agencies in 1984 for permits under the Waste Management Act for the Burrard Thermal Generating Plant near Port Moody, B.C. The results of an extensive environmental assessment indicated that:

- the plant meets all applicable Waste Management Branch emission standards,

- studies by consultants of the Burrard Plant's potential incremental impact on health, vegetation, materials deterioration, water quality and acid deposition all indicate minimal effect.

1.0 INTRODUCTION

B.C. Hydro has been gathering and assessing environmental data related to the Burrard Thermal Generating Plant since 1979. Reports on these activities are now complete. Applications will be made in 1984 under the Waste Management Act to the Greater Vancouver Regional District for an air emissions permit and to the Waste Management Branch for a liquid effluent discharge permit.

The primary purpose of this Progress Report is to summarize the major findings of the study program. This report also provides some general information about the Burrard Plant and an update of the community information and consultation program.

2.0 COMMUNITY INFORMATION AND CONSULTATION PROGRAM

The community information and consultation program was initiated in 1981. Progress Report No. 1 was issued in 1982 and Open Houses were held at the powerplant in March 1982 to provide information about the proposed applications and the environmental studies completed or underway. The next steps in the community information and consultation program are shown schematically in Figure 1.

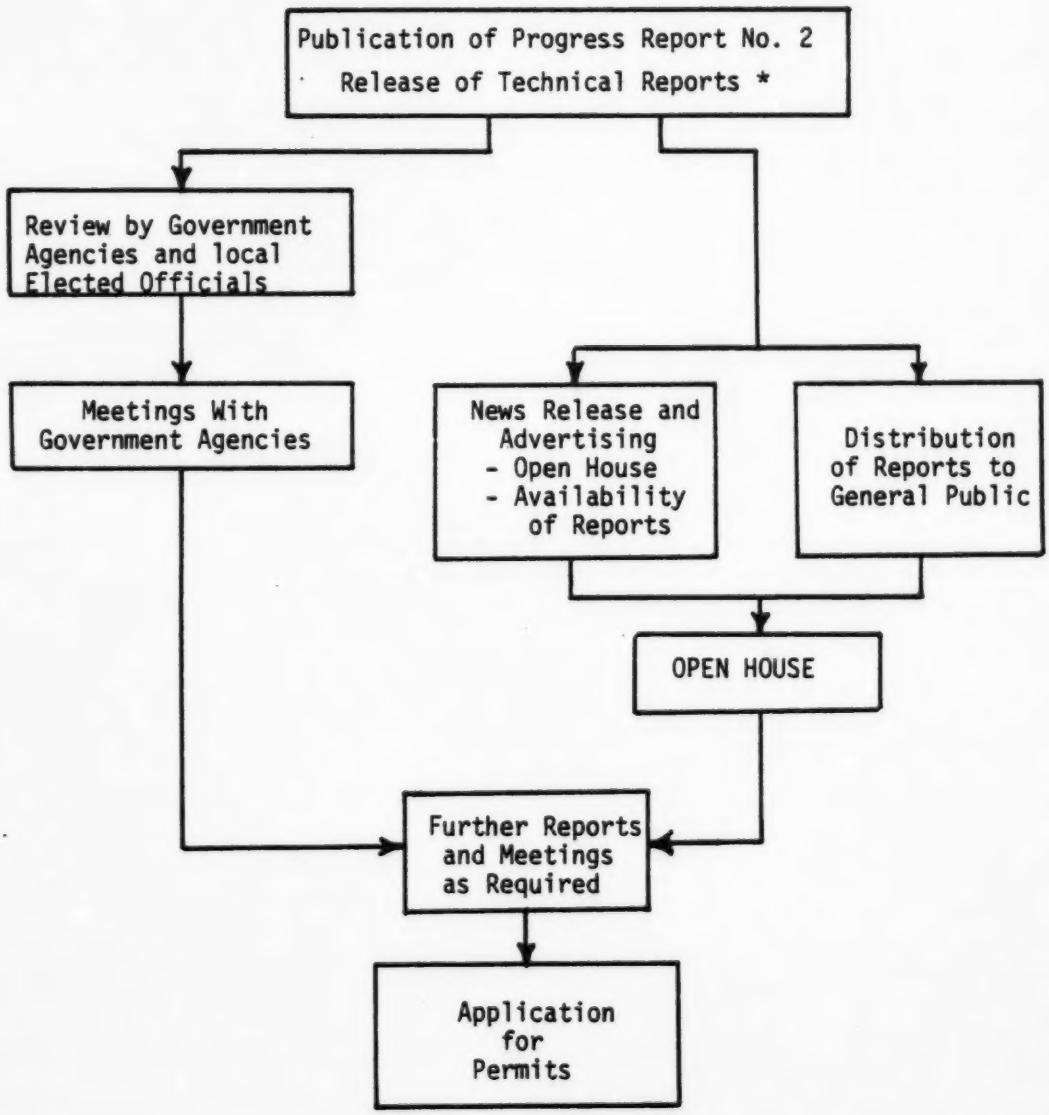
This Progress Report is being distributed to federal, provincial, regional and local government officials and to other interested parties. It is available at local libraries, municipal offices, Information Place in B.C. Hydro's Head Office, 970 Burrard Street and at B.C. Hydro's Coquitlam Office, 2590 Barnet Highway. The Technical Reports are available for public review at local libraries and Information Place.

An Open House will be held in the spring of 1984 to provide the latest information about the proposed applications. The Open House will be advertised locally in advance.

FIGURE 1

BURRARD THERMAL GENERATING PLANT

PUBLIC INFORMATION AND CONSULTATION PROGRAM


Publication of Progress Report No. 2
Release of Technical Reports *
Review by Government Agencies and local Elected Officials
Meetings With Government Agencies
News Release and Advertising
- Open House
- Availability of Reports
Distribution of Reports to General Public
OPEN HOUSE
Further Reports and Meetings as Required
Application for Permits

* For Detailed List See Page 8

If you require further information about this program, or additional copies of this report, please contact Lorna Barr, Community Relations (663-2405).

3.0 HISTORY AND ROLE OF THE BURRARD THERMAL PLANT

The Burrard Thermal Generating Plant was the first major thermal electricity generating plant built in British Columbia. The B.C. Electric Company initiated construction of the plant in 1958. Six units were commissioned one at a time, between December 1961 and April 1975. In the early 1960's B.C. Hydro took over the ownership and the operation of the plant.

The six boiler-turbine-generator units have a total nameplate capacity of 912.5 MW of electricity (1 Megawatt (MW) = 1,000 kilowatts) which represents about 10.3 percent of B.C. Hydro's total generating capacity. Power is generated from natural gas burned in furnaces which heat boilers to produce high pressure steam to drive turbines, which in turn are coupled to generators to produce electricity.

Burrard Thermal presently fulfills the following role in the B.C. Hydro system:

1. To supply emergency generation capability close to the system load centre during transmission outages in storms, etc.

2. To provide a source of electricity if major new projects are delayed.

3. To back up Hydro's hydroelectric generating resources in low water years.

Depending upon water levels in various hydroelectric reservoirs, annual generation required from Burrard can vary from zero to 3430 gigawatt

hours (GW.h). At 70 percent of full-rated capacity Burrard would produce 5520 GW.h annually.

The only fuel currently used or being considered for the plant's future generating requirements is natural gas.

After permits are received under the Waste Management Act the plant will continue to operate as an integral part of the B.C. Hydro system. If this requires the future use of Burrard for export, directly or indirectly from reservoir control, such export would be subject to any applicable National Energy Board Licences and Provincial Energy Removal Certificates.

4.0 ENVIRONMENTAL ASSESSMENT OF THE PLANT

The environmental assessment of the Burrard Thermal Plant addresses the following matters:

1. Stack emissions;
2. Air quality;
3. Water quality;
4. Health impacts;
5. Vegetation effects;
6. Materials deterioration;
7. Acid deposition.

When the First Progress Report was issued in 1982 most of the information concerning items 1 to 3 above was available, including:

- verification of a model to predict dispersion of emissions in Burrard Inlet by Form and Substance Inc.;

- results of tracer tests (a measure of dispersion of Burrard stack emissions) carried out by North American Weather Consultants and B.C. Hydro from September 1979 to October 1980;

- stack emission surveys performed by Envirocon Ltd.;

- supplementary studies on the rates of conversion of nitrogen oxides to nitrogen dioxide and powerplant plume rise, and

- assessment of liquid effluents reported by Beak Consultants Ltd.

Subsequent to Progress Report No. 1 a single document "BTGP Air Emissions and Impacts" has been prepared by B.C. Hydro to draw together the air quality assessment.

Studies on acid deposition, vegetation effects, health impacts and building materials deterioration, have been completed. The following sections briefly describe the environmental assessment carried out and summarize the findings.

5.0 STACK EMISSIONS

Natural gas is well known as the cleanest burning fossil fuel and is the fuel used by the Burrard Plant. The products of combustion of natural gas are water vapour, carbon dioxide and small concentrations of other gases. Included in the other gases are nitrogen oxides (NO_x) which are recognized as the only significant contaminant produced during combustion of natural gas. The level of nitrogen oxides emitted from the Burrard Plant meets the most stringent objective of the Provincial Waste Management Branch (the level A objective is 200 lb of NO_x per million standard cubic feet of natural gas).

Emissions of other contaminants, including sulphur dioxide, hydrocarbons, and particulates are in minimal quantities only.

6.0 AMBIENT AIR QUALITY

The effect of the Burrard Plant's emissions on ambient air quality (that is the air which ground level receptors experience or breathe) has been studied extensively. The air quality assessment dealt with the conversion of primary pollutants (including NO_x) to nitrogen dioxide (NO_2) and the dispersion of this contaminant to ground level.

Since 1981 the assessment of Burrard's NO_x emissions on air quality has centred around data interpretation and reporting, although additional field data was collected in September 1982. Further analysis of the oxides of nitrogen data from the GVRD network for the years 1978 to 1981 has improved our understanding of seasonal and daily characteristics which currently exist in the Burrard Inlet area. The data show that NO_2 levels have met all the National Air Quality Objectives, for example, 99.7 percent of all 1-hour readings fell below one-half of the criteria. No significant difference in ambient air quality has been found between plant operating and non-operating periods.

The air quality was assessed for the historical full load powerplant operation which is 600 MW (65 percent nameplate capacity). The results of this assessment show that over 99 percent of the time ambient NO_2 levels will be less than the Canadian Federal Maximum Acceptable criteria of 400 $\mu g/m^3$ averaged over 1 hour. During poor dispersive periods in the fall and winter when ambient NO_2 levels are higher than normal, it is possible that the 1-hour criteria could be exceeded for a few hours in a year. The significance of these elevated levels has been considered in the sections on health and vegetation.

7.0 WATER QUALITY

The Burrard Plant uses a large amount of sea water for cooling purposes and returns this warmed water to Burrard Inlet. Water from Buntzen Lake is also used and discharged into Burrard Inlet.

Assessment of water quality effects was discussed in Progress Report No. 1. Conclusions from the 1980 study carried out by Beak Consultants Ltd. indicated that past effluent discharges from the Burrard Thermal Generating Plant have not impaired aquatic life in the Port Moody arm of Burrard Inlet. Benthic (bottom-dwelling organisms) studies showed a continuance of the improving trend noted in earlier studies. This improvement is likely attributable to industrial effluent control and sewage disposal methods. The consultant has further estimated that effective flushing occurs in Burrard Inlet near the Burrard Plant. About one-third of the Port Moody arm water is exchanged per mean tide cycle which is a very effective heat dispersal mechanism. As a result, future operation of the Burrard Plant is not expected to have significant effects.

8.0 HEALTH IMPACTS

The health impacts resulting from ambient NO_2 formed from Burrard's emissions has been assessed by Dr. S. Simmons of Systems Application Inc. Published investigations of human response to nitrogen dioxide exposure were examined. This information suggests that existing ambient levels of ozone, sulphur dioxide and carbon monoxide do not result in synergistic effects (effects greater than the combined individual effects) with nitrogen dioxide.

Dr. Simmons further observed that the minimum level for nitrogen dioxide to produce an adverse health response in asthmatics or chronic bronchitics is approximately 940 $\mu g/m^3$, and that the Canadian federal guideline of 400 $\mu g/m^3$ (maximum acceptable level of nitrogen dioxide averaged over a 1 hour period) contains a margin of safety somewhat greater than a factor of 2. He concludes that the operation of the Burrard Plant would not be adverse to public health.

9.0 VEGETATION EFFECTS

Dr. V. Runeckles of U.B.C. has reviewed information on the present ambient air quality in the region surrounding the eastern end of Burrard Inlet, and the estimates of air quality to be expected with the operation of the Burrard Plant. This information has been interrelated with the known effects on plants of the principal air pollutants emitted by the generating station.

While the Burrard Plant's emissions will inevitably contribute to the total amount of NO_2 and NO in the region, it is the judgement of Dr. Runeckles that the predicted ambient concentrations are unlikely to cause any measurable deleterious effects on vegetation.

There is potential for a measurable but slight reduction in plant growth due to elevated concentrations of NO_2 in combination with other pollutants such as sulphur dioxide and ozone. Dr. Runeckles did not find evidence that such combinations involving present levels of NO_2 have caused plant injury.

10.0 MATERIALS DETERIORATION

The materials deterioration study conducted by B.H. Levelton and Associates reviewed the known effects on construction materials from air pollutants emitted by the generating station. While the assessment was complicated by the lack of specific experimental data for nitrogen oxides, certain general observations have been made. Using the most severe assumptions the consultant has estimated that the maximum effect of the increase in nitrogen oxides from BTGP on corrosion of unprotected steel and iron would be about 1 percent. Other building materials are even less susceptible to attack. Since exposed iron and steel are typically protected with surface coatings the actual increased deterioration of construction materials will be extremely small.

11.0 ACID DEPOSITION

The assessment of acid deposition potential from the Burrard Thermal Generating Plant has been addressed by Concord Scientific Corporation. The assessment was based on the emission rate of nitrogen oxides from the Burrard Plant relative to the total emissions of various pollutants in the GVRD and incorporated relevant meteorological and climatological data. A model of chemical transformation and pollutant deposition was applied. Conservative assumptions were used throughout the assessment process, so that the estimates obtained for the long-term incremental effect of the Burrard Plant on acid deposition would represent an upper limit.

The results of the assessment predict that wet and dry depositions from the Burrard Plant would be a very small increment above depositions already taking place from other emissions. Available data indicate that existing acid deposition rates have not caused changes in alkalinity and pH for a number of lakes in the GVRD. The incremental effect of plant emissions is therefore not expected to be measurable.

12.0 LIST OF STUDIES

Technical studies completed and listed below have been used to provide information for this Progress Report (Reports no. 1 to no. 6 (below) were released in 1982 and no. 7 to no. 12 are being released in 1984). These studies are available for public review at local libraries and B.C. Hydro's Information Place.

1. "IMPACT Model Validation for Burrard Thermal Gas Tracer Study, 24 to 30 September, 1979", Form & Substance Inc.

2. "SF_6 Gas Tracer Study at Burrard Thermal Generating Plant", Volume I, Volume II, June 1980, North American Weather Consultants.

3. "Boiler Emission Survey - Burrard Generating Plant", 2 Surveys, September 1979 and February 1980, Envirocon Ltd.

4. "Description of a Plume Rise Study at the Burrard Inlet Power Plant", May 1980, The MEP Company.

5. "An Investigation of NO_2/NO_x Ratios Observed in the Burrard Thermal Generating Plant Plume 1979 - 1980", March 1981, North American Weather Consultants.

6. "Burrard Thermal Generating Plant, Liquid Effluents - Environmental Impact Assessments", November 1980, Beak Consultants Ltd.

7. "Burrard Thermal Generating Plant Air Emissions and Impacts", April 1982, Revised July 1983, B.C. Hydro.

8. "Analysis of Nitrogen Oxides Air Quality Data For the Greater Vancouver Regional District 1978-1981", February 1983, Concord Scientific Corporation.

9. "Assessment of Possible Vegetation Effects of Airborne Emissions From the Burrard Thermal Generating Plant Operating on Natural Gas", July 1983, Dr. V.C. Runeckles.

10. "Potential Health Impacts Resulting From BTGP NO_2 Emissions", April 1983, Systems Applications, Inc.

11. "Impact of Potential Emissions From the Burrard Thermal Generating Plant on Building Materials In the Greater Vancouver Regional Airshed", August 1983, B.H. Levelton & Associates Ltd.

12. "Assessment of the Potential Incremental Acid Deposition In the Greater Vancouver Area From the Burrard Thermal Generating Plant", April 1983, Concord Scientific Corporation.